

Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

24 OCT 2001

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference in 99013	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FR00/00916	International filing date (day/month/year) 11 April 2000 (11.04.00)	Priority date (day/month/year) 29 April 1999 (29.04.99)
International Patent Classification (IPC) or national classification and IPC C23C 16/04		
Applicant SIDEL ACTIS SERVICES		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

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Date of submission of the demand 11 November 2000 (11.11.00)	Date of completion of this report 07 February 2001 (07.02.2001)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/FR00/00916

I. Basis of the report

1. With regard to the **elements** of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
 pages _____ 1-8 _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the claims:
 pages _____ 1-13 _____, as originally filed
 pages _____, as amended (together with any statement under Article 19
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the drawings:
 pages _____ 1/1 _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
 These elements were available or furnished to this Authority in the following language _____ which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1 Statement**

Novelty (N)	Claims	1-13	YES
	Claims		NO
Inventive step (IS)	Claims	1-13	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-13	YES
	Claims		NO

2. Citations and explanations**1. The following documents are referred to:**

D1: WO-A-99/17334 (LAURENT JACQUES; TETRA LAVAL HOLDINGS & FINANCE (CH)) 8 April 1999 (1999-04-08)

D2: EP-A-0 991 197 (LEYBOLD SYSTEMS GMBH) 2 December 1998 (1998-12-02)

D3: EP-A-0 346 168 (CENTRE NAT RECH SCIENT) 13 December 1989 (1989-12-13).

2. D3 is considered to represent the closest prior art. D3 describes a plasma reactor comprising a metal chamber (10) (made of copper, for example) designed to receive a selected gas flow, a microwave source (32) and wave-guide means (34) to guide the microwaves to the chamber (10). The end portion of the wave-guide means (38) gradually narrows in one direction and widens in the other until it has a straight, flat, rectangular cross-section fully surrounding said chamber (10) and forms a non-resonant coupling (50) with the chamber (10) (see Claim 1). Figures 1 and 2 and the corresponding passages of the description (column 3, lines 10-59) indicate that the chamber (10) has a shell that is

generally cylindrical in shape. The chamber (10) has an internal cylindrical tube (12) concentric with the chamber (10), with a wall made of a material providing low dielectric losses, such as quartz. The tube (12) has a circular orifice at each of its ends (14 and 16). The circular opening (20) is entirely closed by a circular metal cover (22) made of aluminium, for example. The cover (22) has a central drilled orifice through which a tube (24) can pass, the end (26) of which opens into tube (12). A selected gas flow circulates in tube (24). Tube (24) can be connected by conventional means to cylinders containing gases such as argon, oxygen, helium, etc.. The plasma reactor also comprises a microwave generator (32) suitable for operating at a frequency of approximately 2.45 GHz and at a power of 1.2 kW. Wave-guide means (34) guide the microwaves to the chamber (10) using a non-resonant coupling, whereby the chamber (10) does not dissipate, as electromagnetic radiation, the microwave energy imparted to it when gas is present in said chamber (10). The initial (36) and intermediate (37) portions of the wave-guide means are rectangular in cross-section. The electromagnetic energy propagates through this guide in the longitudinal direction of the guide (34; arrow (a)), with the electric field (E) extending transversely in relation to direction (a).

- 2.1 D3 does not describe a wave-guide tunnel opening into a side wall of the chamber in the form of a window which, when projected onto a plane tangential to the chamber, has a rectangular shape of which the smallest dimension is the one along the cylindrical axis of the chamber. Neither does D3 describe the

internal diameter of the chamber as being such that the microwaves propagate through the chamber primarily in a mode in which the electric field resulting from the microwave propagation is rotationally symmetrical in the axial direction.

- 2.2 The other documents - D1 and D2 - describe microwave reactors comprising coupling devices which extend coaxially with the main (cylindrical) axes of the chambers.
3. Consequently, Claim 1, and likewise dependent Claims 2-13, which are dependent on Claim 1, are novel in relation to D3, D1 and D2. The combination of D3 with D1 or D2 does not lead to the subject matter of Claims 1-13. The device enables optimal propagation of the microwaves to be achieved, thereby providing good plasma homogeneity.
- 3.1 Consequently, the subject matter of Claims 1-13 satisfies the requirements of PCT Article 33.

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. Claims 2-7 and 9-13 are unclear in that they relate partially or entirely to method features which are not necessarily limiting for a device.
2. No document reflecting the prior art described on page 1 has been cited in the description (PCT Rule 5.1(a)(ii)).

UNIQUEMENT A TITRE D'INFORMATION

Codes utilisés pour identifier les Etats parties au PCT, sur les pages de couverture des brochures publiant des demandes internationales en vertu du PCT.

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